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(54) Title of the invention: Device and method for network management, and storing medium
(57) Abstract:
Problem to be solved: To enable other general users to always obtain information from each device on the specific state of a device on a network edited by network manager.
Solution: The specific state information on a device defined by the user is registered at each device by a SNMP protocol processing layer 306. The registered user defined device state information is acquired from the device via a device unique information acquisition setting part 305. A device detail information display part 303 communicates the acquired user defined device state information to the user.

[Claims]

[Claim 1] A network management device that acquires information from this device, and notifies a user or sets up information to this device according to a user's directions, it communicates with this device and a predetermined protocol via a device connected to a network and this network characterized by including a user definition device status information registering means that registers specific state information on this device defined by user, a user definition device status information acquisition means that acquires this user definition device status information registered by the mentioned above user definition device status information registering means from this device, a user definition device status information notification means that notifies a user of user definition device status information acquired by the mentioned above user definition device status information acquisition means.

[Claim 2] The network management device according to claim 1 including a user definition device status information input means for making a user specify arbitrary legible messages as the mentioned above user definition device status information.

[Claim 3] The network management device according to claim 1 characterized by that the mentioned above user definition device status information has a user definition device status urgency input means who makes a user input information that shows urgency of a defined device status.

[Claim 4] The network management device according to claim 1 characterized by that the mentioned above predetermined protocol is SNMP protocol.

[Claim 5] The network management device according to claim 1 accessing MIB that SNMP Agent that operates with this device by a network using SNMP protocol manages, and registering this user definition device status information, the mentioned above user definition device status information registering means.

[Claim 6] The network management device according to claim 1 characterized by that the mentioned above user definition device status acquisition means accesses MIB that SNMP Agent that operates with this device by a network using SNMP protocol manages and acquires this user definition device status information.

[Claim 7] The network management device according to claim 1 characterized by that the mentioned above device is a printer.

[Claim 8] A network management method in a network management device that acquires information from this device, and notifies a user or sets up information to this device according to a user's directions characterized by including a user definition device status recording step that registers specific state information on this device defined by user, it communicates with this device and a predetermined protocol via a device connected to a network and this network the following, a user definition device status information acquisition step that acquires this user definition device status information registered by the mentioned above user definition device status recording step from this device, a user definition device status information notification step that notifies a user of user definition device status information acquired by the

mentioned above user definition device status information acquisition step.

[Claim 9] The network management method according to claim 8 including a user definition device status information inputting step for making a user specify arbitrary legible messages as the mentioned above user definition device status information.

[Claim 10] The network management method according to claim 8 characterized by that the mentioned above user definition device status information has a user definition device status urgency input step into which a user is made to input information that shows urgency of a defined device status.

[Claim 11] The network management method according to claim 8 characterized by that the mentioned above predetermined protocol is SNMP protocol.

[Claim 12] The network management method according to claim 8 accessing MIB that SNMP Agent that operates with this device by a network using SNMP protocol manages, and registering this user definition device status information, the mentioned above user definition device status recording step.

[Claim 13] The mentioned above user definition device status acquisition step, the network management method according to claim 8 accessing MIB that SNMP Agent that operates with this device by a network using SNMP protocol manages and acquiring this user definition device status information.

[Claim 14] The network management method according to claim 8 characterized by that the mentioned above device is a printer.

[Claim 15] A storage which a computer that recorded a program for performing a user definition device status information notification step which notifies a user of user definition device status information acquired by the mentioned above user definition device status information acquisition step can read, it communicates with this device and a predetermined protocol via a device connected to a network and this network, to a network management device that acquires information from this device and notifies a user or sets up information to this device according to a user's directions. A user definition device status recording step that registers specific state information on this device defined by user, a user definition device status information acquisition step that acquires this user definition device status information registered by the mentioned above user definition device status recording step from this device.

[Claim 16] The storage according to claim 15 including a user definition device status information inputting step for making a user specify arbitrary legible messages as the mentioned above user definition device status information.

[Claim 17] The storage according to claim 15 characterized by that the mentioned above user definition device status information has a user definition device status urgency input step into which a user is made to input information that shows urgency of a defined device status.

[Claim 18] The storage according to claim 15 characterized by that the mentioned above predetermined protocol is SNMP protocol.

[Claim 19] The storage according to claim 15 characterized by that the mentioned above user definition device status recording step accessing MIB that SNMP Agent that operates with this device by a network using SNMP protocol manages, and registering this user definition device status information.

[Claim 20] The storage according to claim 15 characterized by that the mentioned above user definition device status acquisition step accesses MIB that SNMP Agent that operates with this device by a network using SNMP protocol manages and acquires this user definition device status information.

[Claim 21] The storage according to claim 15 characterized by that the mentioned above device is a printer.

[Detailed description of the invention]

[0001]

[Field of the invention] This invention communicates with this device and a predetermined protocol by the device connected to the network and this network, information is acquired from this device and it is related with the network management device, network management method, and storage that notify a user or set up information to this device according to a user's directions.

[0002]

[Description of the prior art] In a computer network system in recent years, various peripheral equipment, for example, a plurality of printers and a plurality of computers, is connected to a network, and construction of a large-scale network printing system is achieved.

[0003] Some trials are made in many standard organizations until now as a method for managing the device on the network which constitutes a large-scale network system. International Organization for Standardization (ISO) provided the general-purpose standard framework called an open systems interconnection (OSI) model. The OSI model of a network management protocol is called a common management information protocol (CMIP). CMIP is a common network management protocol of Europe.

[0004] In recent years, as a network management protocol with higher similarity, there is a protocol of the complete-change kind relevant to CMIP called a simple network management protocol (SNMP) (a guide to "TCP/IP network management, aiming at practical management". M. T. / Takeshi Nishida = the translation Toppan issue August 20, 1992 first edition reference).

[0005] According to this SNMP network management art, to a network management system, the network management protocol used in order that management object nodes and the managing station and agent of some in which at least one Network Management Station (NMS) and each contain an agent may exchange management information is contained.

[0006] By communicating with the agent software on management object nodes using network management software on NMS, the user can acquire the data on a network and can change data.

[0007] An agent is software that runs as a back round process about each target device here. If a user demands management data from the device on a network, management software will put object identification information into a management packet or a frame and will send it out to a target agent. An agent interprets the object identification information, takes out the data corresponding to the object identification information, puts the data into a packet and returns to a user. Occasionally, a process may be called in order to take out data.

[0008] The agent holds the data about his state in the form of a database. This database is called MIB (Management Information Base). MIB is having the data structure of a tree structure and a number is assigned to a meaning in all the nodes. The identifier of this node is called an object identifier (OBJECT IDENTIFIER).

[0009] The structure of this MIB is called Structure of Management Information (SMI), it is prescribed by RFC1155 Structure and Identification of Management Information for TCP/IP-based Internets. Next, SNMP protocol is explained briefly.

[0010] PC (a manager is called next) in which the network management utility software is operating and the administration object network device (an agent is called next) with which the SNMP Agent is operating

communicate using SNMP protocol. There are five kinds of commands in SNMP protocol, and it is referred to as GetRequest, GetNextrequest, GetResponse, setRequest and Trap, respectively.

[0011] GetRequest and GetNextRequest are commands that a manager sends out to an agent, in order that a manager may acquire the value of an agent's MIB object.

[0012] The agent who received this command informs the value of MIB object by sending out the GetResponse command to a manager.

[0013] SetRequest is a command that a manager sends out to an agent, in order that a manager may set up the value of an agent's MIB object. The agent who received this command sends out the GetResponse command to a manager, in order to notify a manager of a setting result.

[0014] Trap is a command that an agent sends out to a manager, in order that an agent may notify change of his own state to a manager.

[0015] Although the information exchanged by SNMP protocol is various, there is information on communication relation called the statistical history and the present state of various setting out of the network interface in which the agent operates as a typical thing, and communication. Also, there is much information about the device connected to the network interface by the network interface concerned. For example, in the case of a network printer, they are an operating state of a printer body, the information about performance and equipment, etc.

[0016] As an operating state of the device body exchanged between an agent and a manager by SNMP protocol, in the case of a network printer and a copying machine, toner residue, the existence of paper plugging, the thing about the hardware which the door of paper residual quantity and a device body called the switching condition, and the paper cassette called the loaded state or the thing about the software of various kinds of errors generated in the network printing function that a device provides is contained.

[0017] In this case, a manager asks an agent the current value by GetRequest and GetNextRequest that were mentioned above and an agent answers it and answers by GetResponse.

[0018] The state of a device can be known by a network, without a device's actually going to the place that exists physically, and the administrator of the network device which is a user by carrying out like this judging from appearance or seeing the display on a navigational panel.

[0019] Generally, the remote management program that operates by the manager side displays on GUI the value obtained by asking the current value first using SNMP protocol. When a user changes a preset value, a new value is inputted instead of the current value and directions of setting out are issued.

[0020] Next, a remote management program sends the inputted value to the agent side by SetRequest as change of the value of MIB object. An agent changes setting out inside a device based on the received value or holds information.

[0021]

[Problems to be solved by the invention] Conventionally, the user was able to be notified only of the state information preliminary defined by the remote management program of the network device explained to the preceding clause according to a logical function like the hardware of a device or network printing.

[0022] However, the administrator of a network device, it will be necessary to give a user the state information of the field that carries out the management activity of each device sometimes like the management activity information on a specific device, including use of a printer becoming improper temporarily for the maintenance of a server etc. or problem information, including a paper jam occurring easily by a double-side printing function etc.

[0023] Thus, the administrator could not but use other connecting means like the function to set general-purpose management information as a device and an E-mail.

[0024] However, since the former was not a thing of a particular application, it was not effective, and problems, like since an administrator has to start a plurality of tools, and also the latter cannot check a situation when the user of the printer concerned is arbitrary, it is inconvenient and it is pointed out.

[0025] In order that this invention might solve the mentioned above problem and the purpose of this invention are that it communicates with this device and a predetermined protocol via the device connected to the network, and this network, it is a network management device that acquires information from this device, and

notifies a user or sets up information to this device according to a user's directions, by registering the specific state information on this device defined by the user, acquiring this, registered user definition device status information from this device and notifying a user of the user definition device status information this acquired, other general users by a network administrator. It is providing the network management device, network management method and storage which can build the high network management system of the convenience that can obtain the information about the specific state of the device on the edited network from each device at any time free.

[0026]

[Means for solving the problem] The 1st invention according to this invention communicates with this device and a predetermined protocol via a device connected to a network, and this network, it is a network management device that acquires information from this device, and notifies a user or sets up information to this device according to a user's directions, a user definition device status information registering means (it is equivalent to the whole control part 301 shown on drawing 3) that registers specific state information on this device defined by user, a user definition device status information acquisition means (equivalent to the device unique information acquisition setting part 305 shown on drawing 3) that acquires this user definition device status information registered by the mentioned above user definition device status information registering means from this device,

including a user definition device status information notification means (equivalent to the device detailed information display part 303 shown on drawing 3) that notifies a user of user definition device status information acquired by the mentioned above user definition device status information acquisition means.

[0027] The 2nd invention according to this invention includes a user definition device status information input means (equivalent to composition inputted with the keyboard 209 shown on drawing 2 via a user interface shown on drawing 9) for making a user specify arbitrary legible messages as the mentioned above user definition device status information.

[0028] The 3rd invention according to this invention, the mentioned above user definition device status information includes a user definition device status urgency input means (equivalent to composition inputted with the keyboard 209 shown on drawing 2 via a user interface shown on drawing 9) who makes a user input information that shows urgency of a defined device status.

[0029] The mentioned above predetermined protocol of the 4th invention according to this invention is SNMP protocol.

[0030] The 5th invention according to this invention accesses the mentioned above user definition device status information registering means at MIB which SNMP Agent that operates with this device by a network using SNMP protocol manages and registers this user definition device status information.

[0031] The 6th invention according to this invention accesses the mentioned above user definition device status acquisition means at MIB which SNMP Agent that operates with this device by a network using SNMP protocol manages and acquires this user definition device status information.

[0032] The mentioned above device of the 7th invention according to this invention is a printer (equivalent to printer 105, 109, 102, 116 shown on drawing 1).

[0033] The 8th invention according to this invention communicates with this device and a predetermined protocol via a device connected to a network, and this network, it is a network management method in a network management device that acquires information from this device, and notifies a user or sets up information to this device according to a user's directions, a user definition device status recording step (step (901)- (906) shown on drawing 13) that registers specific state information on this device defined by user, a user definition device status information acquisition step and (step (801) - (804) shown on drawing 12) that acquire this user definition device status information registered by the mentioned above user definition device status recording step from this device, including a user definition device status information notification step (step (810) shown on drawing 12) that notifies a user of user definition device status information acquired by the mentioned above user definition device status information acquisition step.

[0034] The 9th invention according to this invention includes a user definition device status information inputting step (step (904) shown on drawing 13) for

making a user specify arbitrary legible messages as the mentioned above user definition device status information.

[0035] The 10th invention according to this invention includes a user definition device status urgency input step (step (903) shown on drawing 13) into which a user is made to input information that shows urgency of a device status by which the mentioned above user definition device status information was defined.

[0036] The mentioned above predetermined protocol of the 11th invention according to this invention is SNMP protocol.

[0037] The 12th invention according to this invention accesses the mentioned above user definition device status recording step at MIB that SNMP Agent that operates with this device by a network using SNMP protocol manages, and registers this user definition device status information.

[0038] The 13th invention according to this invention accesses the mentioned above user definition device status acquisition step at MIB that SNMP Agent that operates with this device by a network using SNMP protocol manages, and acquires this user definition device status information.

[0039] The mentioned above device of the 14th invention according to this invention is a printer.

[0040] The 15th invention according to this invention communicates with this device and a predetermined protocol via a device connected to a network and this network, to a network management device that acquires information from this device, and notifies a user or sets up

information to this device according to a user's directions. A user definition device status recording step (step (901) - (906) shown on drawing 13) that registers specific state information on this device defined by user, a user definition device status information acquisition step (step (801) - (804) shown on drawing 8) which acquires this user definition device status information registered by the mentioned above user definition device status recording step from this device, by the mentioned above user definition device status information acquisition step. A program for performing a user definition device status information notification step (step (810) shown on drawing 12) that notifies a user of user definition device status information acquired is made to record on a recording medium so that reading of a computer is possible.

[0041] The 16th invention according to this invention has a user definition device status information inputting step (step (904) shown on drawing 13) for making a user specify arbitrary legible messages as the mentioned above user definition device status information.

[0042] The 17th invention according to this invention has a user definition device status urgency input step (step (903) shown on drawing 13) into which a user is made to input information that shows urgency of a device status by which the mentioned above user definition device status information was defined.

[0043] The mentioned above predetermined protocol of the 18th invention according to this invention is SNMP protocol.

[0044] The 19th invention according to this invention accesses the mentioned above user definition device status recording step at MIB that SNMP Agent that operates with this device by a network using SNMP protocol manages and registers this user definition device status information.

[0045] The 20th invention according to this invention accesses the mentioned above user definition device status acquisition step at MIB that SNMP Agent that operates with this device by a network using SNMP protocol manages and acquires this user definition device status information.

[0046] The mentioned above device of the 21st invention according to this invention is a printer.

[0047]

[Embodiment of the invention] Drawing 1 is a block diagram explaining the composition of the network system including the information processor that can apply the network management device in which one embodiment of this invention is shown and corresponds to the example of the network system to which the device that network management software manages is connected.

[0048] In drawing 1, 101 is a network board (NB) for connecting a printer to a network, and is connected to the printer 102 with open architecture. NB101 is connected by LAN interfaces, such as Ethernet interface 10Base2 that has a coaxial connector in Local Area Network (LAN) 100 and 10 BaseT with RJ-45.

[0049] 103,104 is a personal computer (PC), the personal computer (PC) of these plurality is connected to LAN100 and the bases of control of a Network Operating System and these PCs can communicate with NB101.

[0050] Thus, it can be used for network management, one, for example, PC103, of PC. A local printer like the printer 105 connected to PC104 may be connected.

[0051] The file server 106 is connected to LAN100 and the file server 106 manages access to the file stored by the mass (for example, 10 billion bytes) network disk 107.

[0052] 108 makes it print to printers, such as a plurality of printers 109 that are print servers and were connected or the printer 105 in a remote place. Other peripheral equipment that is not represented may be connected to LAN100.

[0053] The file server 106 plays a role of a file management section that performs reception of a file, and memory, queuing, a cash advance and transmission between LAN member.

[0054] For example, the data file created by each of PC103 and PC104, it is sent to the file server 106, the file server 106 arranges these data files in order and the data file put in order according to the command from the print server 108 is transmitted to one of the printers 109.

[0055] PC103 as a client and PC104 as a remote printer, generation of a data file, transmission to LAN100 of a data file generated and reception of the file from LAN100 and also display of those files, and/or processing can be performed, respectively, and it includes a common personal computer.

[0056] Also, the mentioned above system may contain other computer apparatus that is suitable to perform network software, although constituted by common PC (namely, although personal computer apparatus is shown on drawing 1). For example, when UNIX (registered trademark) software is being used, a UNIX workstation may also be included in a network and these workstations can be used with PC currently represented under a suitable situation.

[0057] Usually, LAN, such as LAN100, provides service for comparatively local user groups, such as an user group in one story or a plurality of continuous stories in one building.

[0058] For example, a Wide Area Network (WAN) may be made if a user is in other building and another prefecture, as a certain user separates from other users.

[0059] WAN is the aggregate fundamentally formed by connecting some LAN by high-speed digital circuits, such as a service synthesis digital network (ISDN).

[0060] Thus, as shown on drawing 1, it is connected with LAN100, LAN110, LAN120 via a modem / transponders 130a, 130b and the backbone 140 and WAN is formed.

[0061] Each LAN may contain PC for exclusive use and may contain a file server and a print server if needed.

[0062] As shown on drawing 1, LAN110 includes PC111, PC112, the file server 113, the network disk 114, the print server 115 and the printer 116. By contrast, LAN120 includes only PC121, PC122.

The apparatus connected to LAN100, LAN110 and LAN120 can access the function of the apparatus connected to other LAN via WAN connection.

[0063] The HTML document that the network management software which WWW server 150 is connected to LAN100 and installed on WWW server 150 generated, it can display using the WWW browser installed on PC103 or setting out of a printer performed on the WWW browser on PC103 can also be transmitted to a specific printer via the network management software on WWW server 150.

[0064] In detail, in order to communicate efficiently among various network members, network software, such as software of Novell or UNIX, can be used for the network shown on drawing 1. Although it is also possible to use which network software, it is NetWare of Novell, for example. Software (by the registered trademark of Novell, it is omitted below) can be used. Referring to the on-line documentation enclosed by the NetWare package for the detailed explanation about this software package. This can be purchased with a NetWare package from Novell.

[0065] Drawing 2 is a block diagram explaining the composition of the client 103 shown on drawing 1 and has given the same numerals to the same parts as on drawing 1.

[0066] In drawing 2, 103 is PC in which network management software works and is equivalent to PC (client) 103 shown on drawing 1. PC103 was stored by ROM202 or the hard disk (HD) 211.

Or it has CPU201 that executes the network management program supplied from the floppy (registered trademark) disk (FD) 212 and each device connected to the system bus 204 is controlled in the gross.

[0067] 203 is RAM and functions as the main memory of CPU201, a work area, etc. 205 is a keyboard controller (KBC) and controls the indicating input from the keyboard (KB) 209, an unrepresented pointing device, etc.

[0068] 206 is a CRT controller (CRTC) and controls the display of CRT display (CRT) 210. 207 is a disk controller (DKC) and a boot program, various applications, a compilation file, a user file and a network management program etc. storing on a hard disk (HD) 211 and a floppy disk (FD) 212, access controlling.

[0069] 208 is a Network Interface Card (NIC) and exchanges data in an agent or network equipment and both directions via LAN100.

[0070] Drawing 3 is a block diagram explaining the configuration of module of the network management software (software of a network management device) in the information processor that can apply the network management device according to this invention. The network management software 300 according to this invention is stored in the hard disk 211 (they may be other storages) shown on drawing 2 and is performed by CPU201. In that case, CPU201 uses RAM203 as a work area.

[0071] In drawing 3, if the whole control part 301 manages operation of the whole software and this software is started, control will be first passed to this portion.

The after starting whole control part 301 directs to initialize to the device list indicator 302 and the device detailed information display part 303 first.

[0072] The device list indicator 302 and the device detailed information display part 303 direct initialization to the device search part 304 and the device unique information acquisition setting part 305 at the same time they initialize themselves.

[0073] And after initialization finishes, the whole control part 301 points to internal generation and display of a device list to the device list indicator 302, the device list indicator 302 that received these directions directs to detect the device that becomes an administration object which exists in device search, namely, a network, at the device search part 304.

[0074] Next, when the device search part 304 generates information required for an explorer packet and passes it to the SNMP protocol processing layer 306, the SNMP protocol processing layer 306, the information passed from this device search part 304 is formed into SNMP packet, and the low-ranking TCP/IP protocol processing layer 307 is passed further.

[0075] By this the TCP/IP protocol processing layer 307, if the physical network access layer 308 is passed by making into an IP packet the information handed by this SNMP protocol processing layer 306, this physical network access layer 308 will transmit the passed information to a network medium like Ethernet and will receive the response from a device.

And the received information is given in the direction contrary to having explained now, and results in the device list indicator 302 as device search results.

[0076] The device list indicator 302 that obtained search results from the device search part 304 takes out directions to the device unique information acquisition setting part 305 so that the profile information of the detected device may be obtained. Here, profile information is a device name, a device kind, an address and device status.

[0077] The device unique information acquisition setting part 305 directs to acquire the value of MIB object that has profile information to the SNMP protocol processing layer 306. It is informed one by one the same with these directions having been performed by the mentioned above device search in the TCP/IP protocol processing layer 307 and the physical network access layer 308 and the response from a device follows each class in the reverse direction and is informed to the device unique information acquisition setting part 305.

[0078] If the profile information of a device is received from the device unique information acquisition setting part 305, the device list indicator 302 will generate the list of devices internally and will display a device list further on the user interface shown on drawing 4.

[0079] Drawing 4 is a drawing showing an example of the user interface displayed on CRT210 shown on drawing 2.

[0080] In drawing 4, DL is a device list and the icon that changes with kinds of device is used by this embodiment.

The MAC Address is displayed about the device with which the device name or the device name is not defined under the icon.

[0081] Not only the time of starting, but after that, the device search part 304 performs device search itself periodically, and notifies a result at every time at the device list indicator 302. The device list indicator 302 updates the device list on an inside and a user interface according to the received result.

[0082] If a user selects the icon on device list DL, this information is given to the whole control part 301, and the whole control part 301 directs to display the detailed information of the device chosen as the device detailed information display part 303 according to it. Device detailed information has the following four sorts, so that the tabs TAB1-TAB4 in drawing 4 may represent.

[0083] Tab TAB1 is a tab that displays the state (Status) of a device, the contents will be displayed, if the required situation of demanding cautions from the administrator or general user of the device concerned has occurred even if the state of a device is not the required error of correspondence or the required error of promptly correspondence promptly.

[0084] Tab TAB2 is a tab that displays a job list (Jobs) and the list of print jobs that should be outputted by the selected device is displayed. This acquires information from not a device but a NetWare server, a WindowsNT server, etc. In this display example, since it is easy, a detailed description is omitted.

[0085] Tab TAB3 is a tab that displays the equipment information (Features) on a device and this displays information, including the existence of the size and the residue of the paper currently loaded into each cassette of the printer, and a double-side printing unit, a Page Description Language support, etc.

[0086] Tab TAB4 is a tab of setting out (Setup) of a network interface and it displays the setting-out item of a network interface. By a TCP/IP system, an IP address, a subnet mask, a default gateway address, etc. are included for a protocol in a setting-out item. Setting out of print applications in a NetWare system, such as PSERVER and NPRINTER, is included.

[0087] Drawing 5 is a drawing showing an example of the status display screen of tab TAB1 shown on drawing 4, is the mentioned above Status display, and when an error/alarm condition actually occurs in a device, it corresponds. The same numerals are given to the same parts as on drawing 4.

[0088] In drawing 5, the kind of an error or warning is expressed by the party by the list box LBOX in a drawing. It distinction of an error condition (state where a print job cannot be performed unless it performs suitable treatment promptly) or alarm condition (state that cannot use a part of functions unless it performs suitable treatment), it is performed by the color of the icon that imitated the left side signal (in addition, although not represented, yellow shall correspond to alarm condition corresponding to an error condition in red).

[0089] Bit map BMP of the device that changes with kinds of an error condition or alarm condition the right side in a drawing is displayed.

[0090] More detailed explanation of an error condition or alarm condition is displayed on the lower part in a drawing.

[0091] They are displayed by a plurality of lines when a plurality of error conditions or alarm condition have occurred. The thing corresponding to the error condition or alarm condition of the line as which a right side bit map and explanation of the lower part were chosen by the mouse click is displayed.

[0092] As for the state of the error or warning mentioned above, the respectively peculiar code is assigned in the inside of a device. The object with MIB inside a device has a value of the code assigned to it or a value showing the importance, when an error or alarm condition occurs with a device.

[0093] For example, prtAlertTable defined by Printer MIB (RFC 1759), each entry supports one error or alarm condition, and is defined as having an instance of objects, such as prtAlertSeverityLevel, prtAlertLocation, respectively. When a plurality of errors or alarm condition has occurred, prtAlertTable has a plurality of entries.

[0094] The SNMP Agent of the printer device in this embodiment is supporting prtAlertTable and the code corresponding to each error or alarm condition is defined as prtAlertLocation.

[0095] On the other hand by Printer MIB (RFC 1759), the value of prtAlertSeverityLevel critical (3), warning (4) and other (1) are defined, the mentioned above error condition corresponds to critical (3) and alarm condition supports warning (4), respectively. Some errors and the example of the value of each object instance in warning are shown on drawing 6.

[0096] Drawing 6 is a drawing showing the example of a value of the object instance managed with the network management device according to this invention.

[0097] When an error or alarm condition actually occurs with a device, in drawing 6 SNMP Agent, the value according to a state is given to each instance, such as prtAlertSeverityLevel in the entry that added the entry to prtAlertTable and prtAlertLocation and was added.

[0098] Network management software investigates periodically whether an error or alarm condition has occurred by acquiring the prtAlertTable information in a device from a device using SNMP protocol.

[0099] When having generated, the display generated as shown on drawing 5 is performed. Since the entry concerned of prtAlertTable will be deleted if a device escapes from an error or alarm condition, network management software updates the Status display of drawing 5 according to it.

[0100] Although it was a case where the value of the MIB object corresponding to an error or alarm condition was preliminary defined by the mentioned above example, the case where the administrator of a network printer defines arbitrary errors or alarm condition below is explained.

[0101] A network printer administrator informs the user of this printer of the situation of an own management activity or there is (1) - (3) to define the error or alarm condition that a printer does not notify according to a actual situation and inform the user of a printer.

[0102] For example, (1) because maintenance of NetWare server, it makes for the printer concerned to be unable to use it as Pserver temporarily into alarm condition, and the user of a printer is informed about it. (2) Although the printer itself is not detected, since the double-side printing unit is holding the problem that can easily cause a paper jam, informing the user of a printer as alarm condition. (3) Although the printer itself is not detected, since a paper jam occurs by the conveyance system of a paper, the cases like, such as informing the user of a printer, can be considered by making for it not to be used now and a restoration schedule into an error condition.

[0103] A user defines the information stored in the mentioned above prtAlertTable about these, and the same information as an error or alarm condition.

[0104] Since SNMP Agent manages generation and deletion of the entry of prtAlertTable, methods other than prtAlertTable are used for those information. The one example is newly defining another MIB object and using it. For example, we define the object extPrtUserAlertTable and each of that entry decides to have the object instance defined by ASN.1 shown on drawing 7.

[0105] Drawing 7 and drawing 8 are the drawings explaining the example of an object instance managed with the network management device according to this invention.

[0106] The number of entries of mounting that this table has for convenience is fixed to 3 and the value of each object instance of a vacant entry, suppose that 0 or NULL string is stored (however, extPrtUserAlertIndex is Read-only). The value of extPrtUserAlertSeverityLevel uses the same value as the example shown on drawing 8 defined as prtAlertSeverityLevel.

[0107] The network management software in this embodiment has the function to edit 3 entries of the mentioned above extPrtUserAlertTable.

[0108] Main menu which drawing 9 is a drawing showing the example of a dialog for entry edit displayed on CRT210 shown on drawing 2, and this dialog does not illustrate, it is under «Device». It is started by «Define Errors/Warnings» Immediately after starting, with SNMP protocol, network management software acquires the value of the mentioned above MIB object from a printer and displays it on a dialog (when a dialog opens, the information on the 1st entry is displayed).

[0109] The information inputted into each field is inputted as follows by 3 cases represented previously, for example, respectively. Thus, as each state are shown on drawing 10, it defines.

[0110] Drawing 10 is a drawing explaining the field information table edited by the dialog shown on drawing 9.

[0111] If desired information is inputted and the depression of OK button BT1 is carried out in the dialog shown on drawing 9, network management software will transmit the inputted information to the printer side with SNMP protocol. Next, the SNMP Agent by the side of a printer is stored in the mentioned above MIB object.

[0112] The network management software in this embodiment, the error or alarm condition detected with the SNMP protocol periodically with reference to the information on both extPrtUserAlertTable shown on prtAlertTable shown on drawing 6 mentioned above and drawing 10 is displayed and a user is informed.

[0113] According to this embodiment, as shown on drawing 11, both shall be collectively displayed into the mentioned above Status tab (naturally otherwise, the method of a display is possible). Drawing 7 shows the third case in the mentioned above table.

[0114] Drawing 11 is a drawing showing an example of the user interface in the network management device according to this invention and has given the same numerals to the same parts as on drawing 5.

[0115] Drawing 12 is a flow chart that shows an example of the 1st data processing procedure in the network management device according to this invention, it corresponds to a procedure until network management software acquires information from extPrtUserAlertTable shown on prtAlertTable shown on drawing 6 and drawing 10 and displays on a Status tab.

[0116] First, at a step (801), prtAlertTable counts how many numbers of entries and them at a step (802). When it investigates how many entries prtAlertTable has, it judges whether the number of the remaining entries is «0» and it is judged that it does not have, it jumps to a step (805).

[0117] When it is judged at a step (802) on the other hand that prtAlertTable has some entries, a series of procedure of a step (803) to a step (804) is repeated, the value of prtAlertLocation of all the entries is acquired and it saves on the Alert table (arrangement) that network management software has internally.

[0118] And when it judges that extPrtUserAlertTable is investigated and it was finished at a step (805) whether investigating all the entries and it is judged that investigate prtAlertTable was finished altogether, it progresses to a step (809).

[0119] On the other hand, when it is judged at a step (805) that investigate no entries is finished, next, extPrtUserAlertTable shown on drawing 10 is investigated and the value (name, severity, description) of each object of the next entry is acquired from a printer (806).

[0120] And if it judges whether the value of acquired extPrtUserAlertName is Null (807), it will return to a step (805) if YES becomes, and NO becomes, the value acquired on the internal Alert table on preservation and a concrete target. The value of extPrtUserAlertName, extPrtUserAlertSeverity, extPrtUserAlertDescription is saved on the mentioned above internal Alert table (808) and it returns to a step (805).

[0121] When finishing investigating extPrtUserAlerTable that carried out such and was shown on drawing 10, at a step (809). If it investigates whether tab TAB1 which is Status of the printer concerned is displayed now and NO becomes, processing is ended, only when it is judged that it is YES namely, displayed, the error or warning information which exists all over an internal Alert table is resorted in predetermined order, is displayed (810) and processing is ended. The sorting concerned shall be performed by a fixed error condition, the alarm condition of an user definition, and the device in order of fixed alarm condition with the error condition of an user definition and a device.

[0122] If it states strictly, the mentioned above step (801) to a step (808) and a series of procedure of a step (809) to a step (810) will be mutually performed in asynchronous and it will be repeated each cycle that it has. The mentioned above internal Alert table becomes both point of contact.

[0123] Drawing 13 is a flow chart which shows an example of the 2nd data processing procedure in the network management device according to this invention and corresponds to the procedure performed immediately after an administrator inputs desired information and pushes OK button BT1 in the dialog shown by drawing 9.

[0124] First, the entry counter for managing the entry of what position is processed now is initialized to «1» (901). And the error of a current entry or the name of alarm condition is inputted that it should correspond to EntryText shown on drawing 10, for example, it saves at the internal buffer in PC (902).

[0125] And the error of a current entry or the importance of alarm condition is inputted that it should correspond to Severity Level shown on drawing 10, for example, it saves at the internal buffer in PC (903).

[0126] And the error of a current entry or explanation of alarm condition is inputted that it should correspond to Information shown on drawing 10, for example, it saves at the internal buffer in PC (904).

[0127] And it judges whether an error or alarm condition of an user definition is added (905) and when it is checked that there is no error in an input value, it progresses to a step (907).

[0128] On the other hand, when it is judged that an error or alarm condition of an user definition is added, each input value of an error or alarm condition saved at the mentioned above buffer is transmitted to the printer side using SNMP protocol and it is made to set up and store in MIB object at a step (905) (906).

[0129] And if it judges whether lessons was taken from each entry (according to this embodiment 3 exist as shown on drawing 10), and it investigated, namely, it judges whether the value of an entry counter is «3» (907) and YES becomes, if processing is ended and NO becomes, «1» increment of the entry counter will be carried out (908), it will return to a step (902) and the same processing will be repeated.

[0130] Processing according to the procedure shown on processing according to the procedure shown on drawing 12 and drawing 13 shall be mutually performed in asynchronous.

That is, it is because the contents of extPrtUserAlertTable in a device used in drawing 11 are changed without the flow of drawing 13 synchronizing by the timing (there may also be a case of another user's directions) that directs the processing which a user shows to drawing 12.

[0131] The network printing system that can apply the device controlling device next applied to this invention with reference to the memory map shown on drawing 14 explains the composition of the data processing program that can be read.

[0132] Drawing 14 is a drawing explaining the memory map of the storage that stores the various data processing program that can be read with the network printing system which can apply the device controlling device according to this invention.

[0133] Although it does not illustrate in particular, the information by which the information that manages the program group stored by the storage, for example, version information, a maker, etc. are remembered and for which it depends on OS by the side of program read-out, etc., for example, the icon etc. that carries out the discrimination expression of the program, may be stored.

[0134] Also, the data subordinate to various programs is managed to the mentioned above directory. The program for installing various programs in a computer, the program extracted when the program to install is compressed, etc. may be stored.

[0135] The function shown on drawing 12 and drawing 13 in this embodiment may be carried out with the host computer by the program installed from the outside.

And this invention is applied even when an information group including a program is supplied by the output unit from an external storage via storages, such as CD-ROM, a flash memory and FD or a network in that case.

[0136] As mentioned above, the storage that recorded the program code of the software that realizes the function of the mentioned above embodiment, also when a system or a device is supplied and the computer (or CPU and MPU) of the system or a device reads and executes the program code stored in the storage, it cannot be overemphasized that the purpose of this invention is achieved.

[0137] In this case, the program code itself read from the storage will realize the new function of this invention and the storage that stored that program code will constitute this invention.

[0138] As a storage for supplying a program code, a floppy disk, a hard disk, an optical disc, a magneto optical disc, CD-ROM, CD-R, magnetic tape, a nonvolatile memory card, ROM, EEPROM, etc. can be used, for example.

[0139] By executing the program code that the computer read, based on directions of the program code the function of an embodiment mentioned above is not only realized, but, it cannot be overemphasized that it is contained also when the function of the embodiment that performed a part or all of processing that OS (operating system) etc. that are working on a computer are actual and was mentioned above by the processing is realized.

[0140] After the program code read from the storage was written in the memory with which the function expansion unit connected to the expansion board inserted in the computer or the computer is equipped, it cannot be overemphasized that it is contained also when the function of an embodiment which performed a part or all of processing that CPU etc. with which the expansion board and function expansion unit are equipped are actual, based on directions of the program code and was mentioned above by the processing is realized.

[0141]

[Effect of the invention] As explained above, according to the 1st invention - the 21st invention, it communicates with this device and a predetermined protocol via the device connected to the network and this network, in the network management device that acquires information from this device and notifies a user or sets up information to this device according to a user's directions, by registering the specific state information on this device defined by the user, acquiring this registered user definition device status information from this device and notifying a user of the user definition device status information this acquired, other general users can obtain the information about the specific state of the device on the network edited by the network administrator from each device at any time.

[0142] Since the administrator of a network device can describe and add an error or alarm condition arbitrarily in addition to the error and alarm condition information that are generated automatically, it becomes easy for the administrator of a network device to give other general

users the information according to the using state and problem occurrence situation of the specific device and it does so the effect is excellent in management and cost is reducible etc.

[Brief description of the drawings]

[Drawing 1] is a block diagram explaining the composition of the network system including the information processor which can apply the network management device in which one embodiment of this invention is shown.

[Drawing 2] is a block diagram explaining the composition of the client shown on drawing 1.

[Drawing 3] is a block diagram explaining the configuration of module of the network management software in the information processor that can apply the network management device according to this invention.

[Drawing 4] is a drawing showing an example of the user interface displayed on CRT shown on drawing 2.

[Drawing 5] is a drawing showing an example of the status display screen of the tab shown on drawing 4.

[Drawing 6] is a drawing showing the example of a value of the object instance managed with the network management device according to this invention.

[Drawing 7] is a drawing explaining the example of an object instance managed with the network management device according to this invention.

[Drawing 8] is a drawing explaining the example of an object instance managed with the network management device according to this invention.

[Drawing 9] is a drawing showing the example of a dialog for entry edit displayed on CRT shown on drawing 2.

[Drawing 10] is a drawing explaining the field information table edited by the dialog shown on drawing 9.

[Drawing 11] is a drawing showing an example of the user interface in the network management device according to this invention.

[Drawing 12] is a flow chart which shows an example of the 1st data processing procedure in the network management device according to this invention.

[Drawing 13] is a flow chart which shows an example of the 2nd data processing procedure in the network management device according to this invention.

[Drawing 14] is a drawing explaining the memory map of the storage that stores the various data processing program that can be read with the network printing system which can apply the device controlling device according to this invention.

[Description of numerals]

201 CPU 202 ROM 203 RAM

204 System bus

205 Keyboard controller (KBC)

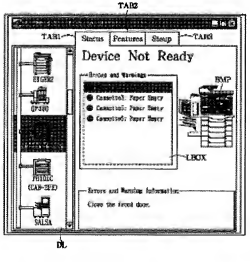
206 CRT controller (CRTC)

207 Disk controller (DKC)

208 Network Interface Card (NIC)

209 Keyboard (KB)
210 CRT display (CRT)
211 Hard disk (HD)
212 Floppy disk drive (FD)
300 Network management program
301 Whole control part
302 Device list indicator
303 Device detailed information display part
304 Device search part
305 Device unique information acquisition setting part
306 SNMP protocol processing layer
307 TCP/IP protocol processing layer
308 Physical network access layer

Drawing 5

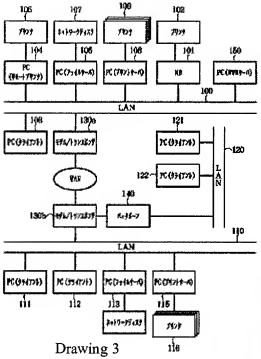


Drawing 6

エラー/警告名称	prtAlertSeverityLevel	prtAlertLocation
TONER LOW	warning (3)	15000
PAPER REMAIN	warning (3)	16000
PRINTER OPEN	critical (4)	40020
PAPER JAM	critical (4)	40080

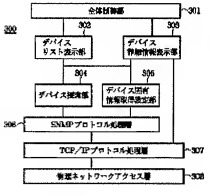
Drawing 1

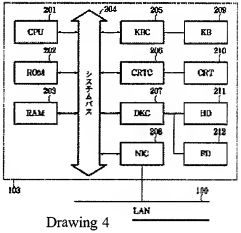
Drawing 2



Drawing 3

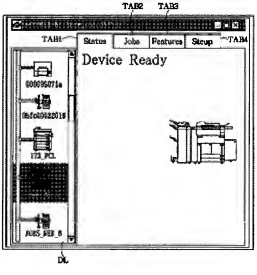
【図３】





Drawing 4

【図４】



Drawing 7

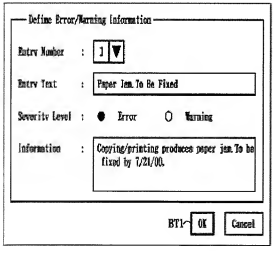
```
    SYNTAX          SEQUENCE OF extPrtUserAlertEntry
    MAX-ACCESS  not-accessible
    STATUS          current
    DESCRIPTION
        ""
    ::= { extPrtUserAlert 1 }
extPrtUserAlertEntry OBJECT-TYPE
    SYNTAX          extPrtUserAlertEntry
    MAX-ACCESS  not-accessible
    STATUS          current
    DESCRIPTION
        "Entries may exist in the table for each device
        index who's device type is 'printer'."
    INDEX   { [illegible] AlertIndex }
    ::= { ext
extPrtUserAlertEntry ::= SEQUENCE {
    extPrtUserAlertIndex            Integer32 2,
    extPrtUserAlertName             OCTET STRING,
    extPrtUserAlertSeverityLevel    INTEGER,
    extPrtUserAlertDescription      OCTET STRING,
}
```

Drawing 8

```
extPrtUserAlertSeverityLevel OBJECT-TYPE
    --This value is a type 1 enumeration
  SYNTAX    INTEGER {
            other(1),
            critical(3),
            warning(4)
        }
  MAX-ACCESS read-only
  STATUS        current
  DESCRIPTION
    "The level
    determines
    table."
  ::={ extPrtUserAlertEntry 2 }
```

Drawing 9

【図9】



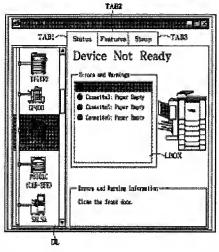
Drawing 10

t table entry.The printer
and to each entry into the

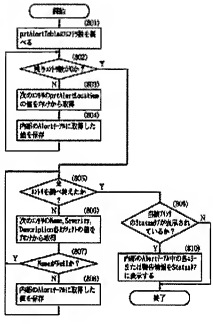
【図10】

Entry Text	Severity Level	Information
Pserver Not Available	Warning	Due to NetWare server is under maintenance, this printer does not work as Pserver.
Duplicate Unit in Disorder	Warning	Duplicate Unit is in disorder. Try another printer.
Paper Jam,To Be Fixed	Error	Copying/printing produces paper jam.To be fixed by 7/21/00.

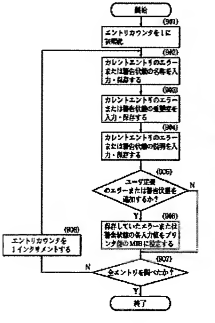
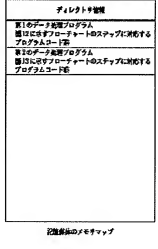
Drawing 11



Drawing 12



Drawing 13



Drawing 14